



HOW FCC RED TAPE SLOWS NEW
WIRELESS TECHNOLOGIES—
AND WHAT TO DO ABOUT IT

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RADIO'S REGULATORY ROADBLOCKS

GREAT NEWS! Your team has come up with a new radio technology—one that may have the same impact as Wi-Fi or Bluetooth. Management loves it, funding is in place, patent applications are filed, production is lined up, and marketing is ready to go. This will be huge.

Or maybe not. Your invention could be illegal in the United States. That's an enormous disadvantage in today's global marketplace.

How a new product could be in violation of the law is not hard to understand. Every radio transmitter sold in the United States must comply with technical rules maintained by the Federal Communications Commission (FCC). These rules set limits on power, bandwidth, out-of-band emissions, modulation, and sometimes other properties. They control interference, promote efficient spectrum use, and protect the public from excessive radio-frequency exposure.



These rules are needed, and they have teeth. It is a federal violation to import, sell, lease, offer, advertise, ship, or distribute a transmitter (or equipment that includes a transmitter) without first establishing FCC compliance. Nobody goes to jail, but violations can draw large fines. Worse, the FCC will order a noncompliant product off the market. For a start-up built around a single technology, a stop-marketing letter from the FCC can be fatal.

The technical rules that deal with mature products are relatively general. But the FCC tends to regulate newer technologies in much greater detail. The specifics in the rules act like a filter, letting through some kinds of products while blocking or delaying others. Such regulation can, naturally enough, create a barrier to innovation.

The contrast between Bluetooth and Wi-Fi provides a real-life example. Both are unlicensed radio technologies. Their current forms appeared in the late 1990s. They share the same frequency band and are regulated under the same section of FCC rules. The designers of Bluetooth stayed within the technical parameters of the relevant rule, and early Bluetooth products reached the market with no significant holdup from the FCC. But the same rule section delayed some forms of Wi-Fi. The 11-megabit-per-second *b* standard was approved when the FCC staff decided, after a vigorous internal debate, that it complied with the rule as written. Approval of the later, 54-Mb/s *g* standard needed a rule change that took two years. That new rule was more flexible, however, allowing the subsequent, much faster *n* standard to sail through with no fuss at all.

Not surprisingly, the FCC rules are organized around existing technologies. As a consequence, the more innovative a new radio product is, the less likely it is to comply. So, for example, approval of a conventional UHF walkie-talkie takes only a few days. But if the product rests on a novel and creative idea—think of spread spectrum in the 1980s, ultrawideband in the 1990s, TV-band “white space” devices in the 2000s—chances are that it won’t reach the

U.S. market until the FCC changes or waives the applicable rules.

The need for a rule change or a waiver would be no big deal if it happened quickly. It doesn’t. Changes to accommodate new technologies take at least two to three years, and in some cases drag on for four or five years. Amending just one number in a rule can be as slow as adding a whole new category of rules. Even waivers, which are procedurally simpler, need a year or two, sometimes more.

Why does it take so long?

IT WOULD BE EASY just to denounce the FCC for bureaucratic inertia. But the truth is more complicated. You’d be more justified in blaming Congress, the courts—and even the Internet.

A 1946 statute, the Administrative Procedure Act (APA), tells all federal agencies, including the FCC, how to adopt new rules or change old ones. The agency must publish information in advance about the proposed rule and accept comments from the public. This provision lets outsiders explain the problems that a proposed rule might cause and offer suggestions for alternatives. Typically, the agency then issues an order that adopts the rule, possibly altered in light of the received comments. Occasionally, it will announce that it is abandoning the proposal.

For 40 years, this process worked quickly and well. The FCC would issue a concise Notice of Proposed Rulemaking (NPRM), usually just a draft of the rule, with a deadline for comments a month away. To prepare and submit comments, you needed the services of a law firm or the equivalent in-house resources, so only those companies and trade associations that really cared took the trouble. Shortly after the comment deadline, the FCC issued a brief order adopting the new rule, or some variation of it. The whole process typically took six months or less—blindingly fast by federal government standards.

But then, starting in the mid-1980s, several unrelated developments formed a perfect storm of regulatory delay.

For one thing, radio technologies began to evolve very quickly, frequently triggering the need to update FCC rules. The year 1985 was a watershed. It brought the first mobile data network (which later served the early BlackBerry devices) and the spread-spectrum rules, the first to authorize high-speed unlicensed digital radio. Ever since, technological changes have arrived at an ever faster pace, which puts a lot of pressure on the FCC to keep the rules current.

A second disruptive element was the emergence of the Web—and in particular the portion of the FCC’s Web site that allows the public to file comments electronically. Now anyone with a computer can participate. Unfortunately, a great many do. The result looks like most other examples of Internet discourse: badly spelled, underinformed, and often wildly off-topic postings, with occasional nuggets of solid fact and sound reasoning. A recent rulemaking on unlicensed white-space devices drew 35 000 comments, of which perhaps a few hundred made useful contributions. But somebody at the FCC has to wade through them all.

The ease of submitting comments also encourages frivolous opposition. Companies selling equipment that operates in a particular band sometimes fight a new use of that band on principle, even if their own products would be unaffected. Associations of radio users raise needless alarms and mobilize their members en masse against even very minor threats, just to make the association look important and keep the dues coming in. Competitors of a would-be entrant may oppose a new rule just to slow the arrival of a threatening innovation.

A third major source of delay came from the courts, particularly the U.S. federal appeals court in the District of Columbia. In the course of interpreting the APA procedures over the years, the court has, in effect, added requirements of its own that greatly increase the work of the FCC and its sister agencies.

The court has, for example, held that in an NPRM, providing the text of the rule is not enough. The agency must also give an “accurate picture of the reasoning that [led] to the proposed rule.” The court requires, too, that the eventual rule be a “logical outgrowth” of the NPRM, disallowing anything that it would categorize as a “surprise switcheroo.”

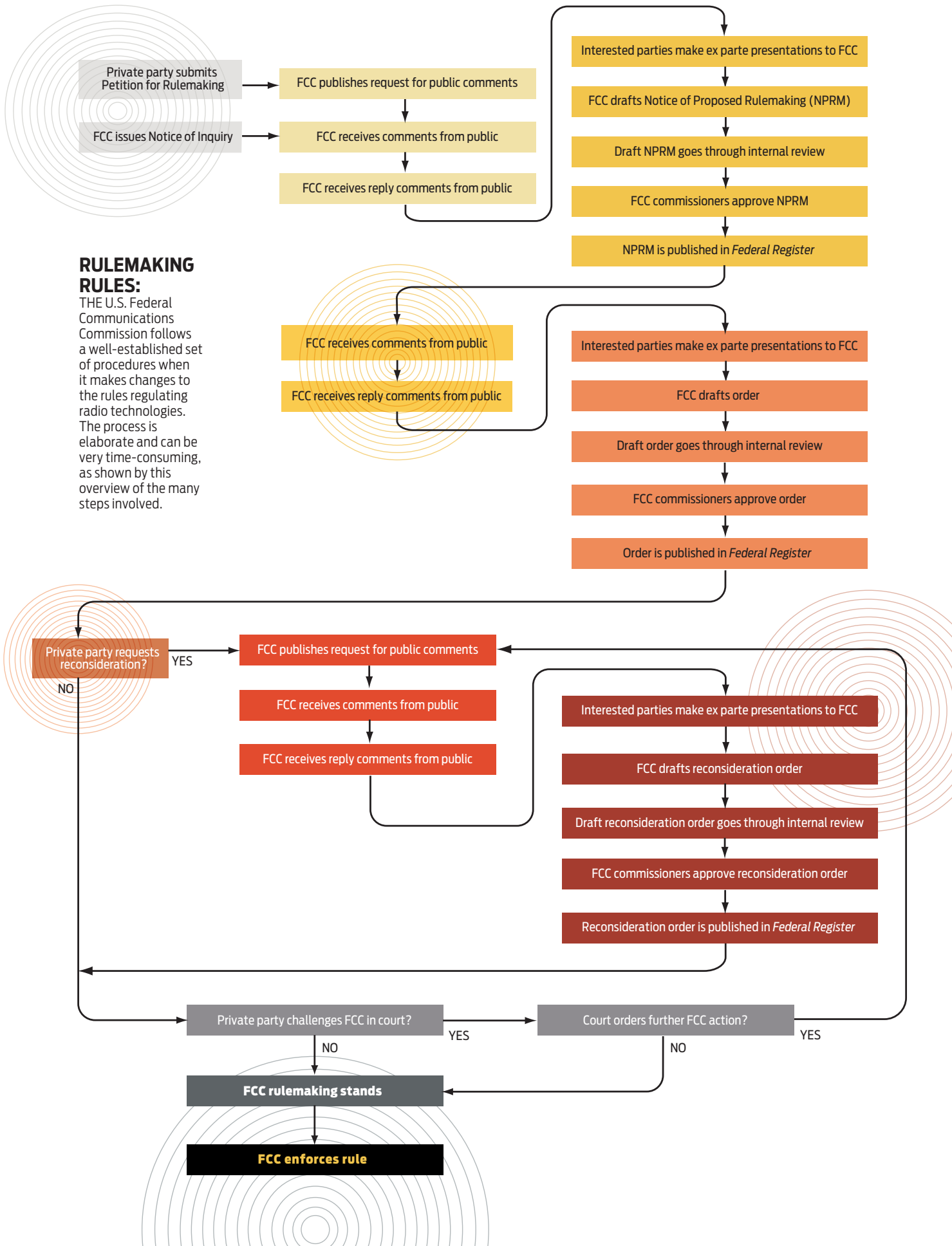
What’s more, the court has stipulated that in adopting a rule the agency must discuss “what major *Continued on page 48*

COPING WITH THE COMMENTS

In 2008 alone, the FCC fielded more than 23 000 electronically filed comments on just one technical issue: the use of low-power devices in the TV white-space bands

RULEMAKING RULES:

THE U.S. Federal Communications Commission follows a well-established set of procedures when it makes changes to the rules regulating radio technologies. The process is elaborate and can be very time-consuming, as shown by this overview of the many steps involved.



Radio's regulatory roadblock

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issues of policy were ventilated...and why the agency reacted to them as it did." And the adopting order must "respond in a reasoned manner to the comments received,... explain how the agency resolved any significant problems raised,...[and] show how that resolution led...to the ultimate rule."

These requirements and others like them add length and complexity to both the NPRM and the order adopting a rule. A recent order authorizing white-space devices took up 130 pages of single-spaced text, much of it addressing these court-imposed requirements. Even the NPRM (issued 52 months earlier!) ran 38 pages. The time needed to draft, edit, and review these documents is a major source of rulemaking delays.

A fourth change comes from the enormous commercial success of radio-based devices, which amounts to many tens of billions of dollars annually. This kind of money raises the stakes for success or failure in the regulatory process. A rule change allowing a company's technology or (almost as good) denying that of a competitor translates quickly into revenues. This gives plenty of incentive to spend time and money at the FCC lobbying for a favorable result or challenging an unwanted outcome afterward.

There is one last reason for the slow pace of regulatory change. With telecommunications being key to the global information economy, the FCC has been thrust to the forefront of national policy-making. This transformation has a downside. When the FCC staff is deep into matters of national political importance—the transition to digital television, say, or a US \$20 billion spectrum auction—issues like a mere technical rule change tend to get pushed aside.

BEFORE SUGGESTING ways to accelerate the process, I should give a few more details on how the system works. A rulemaking gets started in one of two ways. The FCC might issue a Notice of Inquiry, which seeks general views on how best to regulate a new technology. Or a private party might submit a Petition for Rulemaking, which asks for a change



or a new rule. Either way, the FCC sets a deadline for public comment, usually a month or two away, and a date for a second round of input, called reply comments, a month or so later. Even after those dates, interested persons can still make written or oral presentations to the FCC staff, called *ex parte* submissions (Latin for "one sided"). The staff studies the comments, reply comments, and *ex parte* material. In most cases the result is an NPRM that explains the background and proposes specific rules. After a staff member drafts the NPRM, it goes through a complex internal review process and eventually lands on the desks of the five FCC commissioners. Once they have signed off, the NPRM is released to the public. All of that takes about a year.

The NPRM sets dates for still more comments and reply comments, after which interested parties can again make *ex parte* presentations. A given rulemaking might spark scores of trips to the FCC and hundreds of written filings. This in itself is a major cause of delay. Every hour that FCC staffers spend meeting with outsiders is an hour not spent generating the paperwork to adopt the rules. And every *ex parte* filing

(some run to hundreds of pages) must be read, analyzed, and evaluated. Worse, each *ex parte* submission fires up the opponents to chime in with their views. The staff sometimes uses these in-person meetings to probe each side's needs and test possible compromises. But the process still drags out the decision making and bulks up the resulting order.

Once a draft order is ready, it too, like the NPRM, must go through multiple levels of internal review. The FCC's engineers, for example, scrutinize it to ensure that the rules will work in practice. And the lawyers want to be sure that it can withstand an appeal. Eventually, the five commissioners sign off, and the new rules appear in the *Federal Register*. From NPRM to publication of the new rules usually takes at least one, sometimes two, and occasionally three or more years.

But it's not over yet, because any party has the right to ask the FCC for "reconsideration." The white-space ruling of 2008, for example, attracted 19 of these requests. That sets off yet another round of comments and reply comments, another series of *ex parte* presentations, and another carefully drafted and extensively reviewed order a year

or two later. The rules usually stay in effect in the meantime. Reconsideration rarely changes much, but it does divert staff from other work. It also postpones certainty in the final outcome, which can make investors nervous.

Finally, both the original order and the reconsideration order are subject to challenge in court. Such cases used to be uncommon because they are expensive to bring and almost never invalidate the contested rule. At worst, in a technical proceeding, the court might order the FCC to take a second look, while leaving the rule in place. But lately, more companies and organizations have been rolling the dice with court appeals, despite the low likelihood of success.

In 2004, for example, the FCC allowed power companies to provide broadband service over their electric wires. Amateur radio operators, afraid that such operations would interfere with their own communications, opposed the proceeding at every stage. After the FCC denied their request for reconsideration, the amateurs filed an appeal in court. The resulting 2008 court ruling asked the FCC for certain clarifications, but it let the power companies continue to deploy and use the technology in the meantime. These cases remind the FCC staff that they must write every document to anticipate and address the objections an opponent might raise in court. That, of course, takes a lot of time.

A different and somewhat faster approach than changing the rules may work when a product fails to comply but still satisfies the purpose of the FCC's regulations. Perhaps its radiated power is above the maximum allowed, but the intended application is deep inside mines, where it is unlikely to cause interference. Or the new radio equipment might use a band that is ordinarily off limits, but with a modulation that makes it invisible to other users. Such cases are good candidates for a waiver—a ruling that allows the device to be sold despite its noncompliance.

The FCC usually makes waiver requests public, invites comments and reply comments, and carries out the ex parte process. Waivers of technical rules typically take one or two years. Like rulemakings, they are subject to reconsideration and court appeals. Unlike a rulemaking, the waiver applies only to the company that requested it. But the FCC routinely grants identical “me too” waivers to others who ask.

With the needed rule or waiver in place, there is still one step to go, sometimes a big one. Every mobile, portable, and unlicensed transmitter sold in the United States must be certified by the FCC or an authorized company acting on its behalf. With a mature product line, this requires just a few days or weeks. But the first few certifications of a new technology take longer, sometimes three to six months.

HOW MIGHT THE PROCESS BE sped up? Congress could trim back the court-imposed requirements. The FCC could help, too, by making its rules as general as possible, thus reducing the need for frequent changes.

But even as things stand, if your company is promoting a new radio technology, you can improve its chances for approval—and get that approval faster—by keeping in mind a few broad guidelines.

First, plan to share the airwaves. Vacant spectrum is scarce, and it is generally auctioned at very high prices. Most new technologies must cohabit with old ones. So choose a part of the spectrum that avoids sensitive or important

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applications like GPS, radio astronomy, search and rescue, aeronautical, and so forth. And unless requesting a waiver, pick a band already allocated for the same general purpose as your application: fixed, mobile, radar, satellite, whatever. Changing the FCC's allocation for a particular frequency band takes many years. Note also that parts of the spectrum that are shared between the FCC and federal users are available but subject to extra delays. Bands reserved for federal users are barred to rulemakings and inhospitable to waivers.

At the same time, tailor your system to minimize trouble for existing receivers. In a narrowband environment, for example, a system using very short pulses is less likely to affect those receivers adversely than would a system that uses continuous modulation. Keep power levels, bandwidths, out-of-band emissions, and duty cycles as low as is practical. In the end, you should be able to show that your equipment does not significantly increase the risk of harmful interference to others. If you cannot, your system is unlikely to be approved.

Expect vigorous opposition in auctioned, amateur, and satellite-downlink bands, even if your application poses little or no realistic threat of interference. If the parties already using the slice of spectrum you need make up a small group, consider negotiating limitations on deployment or operation of your device to obtain their consent. Their approval greatly improves your chances with the FCC.

Think through whether a grant of the requested rule or waiver might authorize other systems that cause more interference than yours. This will be an important internal question at the FCC. Also, show how the public will benefit from your system. A good way to do this is to accumulate written support from potential users. But tell the truth, and deal with any downsides openly. (Remember, lying to the FCC is a federal crime—up to five years in an orange jumpsuit.)

As with so many aspects of life, it's best to keep things simple. Minimize the number of FCC rules to be amended or waived. Doing so may require some extra care in setting up the request, but it is well worth it.

Above all, plan ahead. Start working through FCC issues early in the design process. Build a compliant device if possible. If not, minimize the required departure from the rules, and go to the FCC as soon as the transmitter specifications are firm—but not before. Changing a request in midcourse not only restarts the whole rigmarole from the beginning, it also incurs ill will at the FCC.

The process eventually does work, most of the time. True, it might seem unfair for your company to have to foot the bills and endure the frustrations when competitors can then exploit the outcome for free. But someone else did just that for each of the new radio-based technologies introduced over the past three decades. Consider it the price of progress. □

DAWDLING FOR A DECADE

The FCC proceeding on ultrawideband rules, which began 11 years ago, is now in its **third round of reconsideration petitions** and is **not over yet**